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William Huggins, Esq., F.R.S., President, in the Chair.

Andrew Ainslie Common, Esq., 37 Eaton Rise, Ealing; and
James Love, Esq., Talbot Lodge, Bickerton Road, Upper Holloway,

were balloted for and duly elected Fellows of the Society.

Visibility of Mercury—and of Venus in Sunshine.

By William F. Denning, Esq., F.M.S.

(*Communicated by the Rev. R. Main, M.A., F.R.S.*)

The favourable east elongation of *Mercury* in May allowed him to be seen here with the naked eye on thirteen evenings; in fact, his detection between the 5th and 28th was merely a question of weather; he was, within these dates, visible every night on which the sky was clear enough. In the early part of the month (7th, 8th, and 9th) he looked brighter than a 1st mag. star on the horizon, being much plainer than *Mars* (about 13° E.), and comparing favourably in point of lustre with α *Aurigæ*. On the 13th the planet was first seen at $8^h\ 20^m$, and remained in view until $9^h\ 40^m$, which gives a duration of visibility of $1^h\ 20^m$, and this was a fair average period for a clear night between about the 10th and 20th. On the 16th the planet was first glimpsed at $8^h\ 35^m$, and on the 18th (sky partly cloudy) at $8^h\ 41^m$, continuing visible till near setting, though on these dates he had become much fainter than on the 7th, 8th, and 9th. On the 19th I watched the planet from $8^h\ 32^m$ to $9^h\ 55^m$ ($1^h\ 23^m$), but his appearance was feeble, especially during the latter part, and certainly less than 2nd mag. On the 21st (day of extreme elong.) the air was very clear in WNW., and the

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planet seen at $8^h 55^m$, but very faintly; his light had evidently gone on decreasing rapidly since the earlier observations. Cloudy weather here supervened. On the 28th the sky was quite clear after sunset. I saw *Mercury* in the finder of my $10\frac{1}{4}$-in. reflector at $8^h 52^m$, and could just glimpse the planet with naked eye at $9^h 20^m$, but it was one of the faintest objects I have ever seen, and smaller than a 3rd mag., which I could have found more easily in the same place. I saw *β Geminorum* (near *Venus*) as early as $8^h 35^m$. The planet set $1^h 50^m$ after the Sun on this date, and for some days afterwards continued well situated as regards elongation, but was totally beyond reach of the naked eye; and the actual decrease in brilliancy between the 7th and 28th must have amounted to about 3·5 mag. The stronger twilight prevailing during the latter part of the elongation partly accounts for his extreme feebleness then, and the difference of phase (from gibbous to a crescent) had a good deal to do with it, though the semi-diameter had increased from $2''·9$ on the 5th to $4''·4$ on the 25th. The loss of phase, however, was not nearly compensated for by increase of size; and this is pointed out in Lardner and Dunkins' "Handbook," in which it is stated of *Mercury* that "it is brightest at a less [than max.] elongation, even though it moves to a greater distance from the earth, since it gains more by the increase of its phase than it loses by increased distance and diminished elongation." This refers to the planet when nearing superior conjunction at W. elongation, but it is also true, conversely, of the E. elongation; and it would appear, therefore, that he is most favourably visible as a naked-eye object a few mornings *after* max. elong. W., and a few evenings *before* max. elong. E. This fact has been strongly marked in previous years, notably in February 1868, when he appeared to rival *Jupiter* on several nights preceding extreme elongation, and on the evenings of May 31, June 1, 2, 3, and 4, 1875, the planet was seen as a conspicuous object though the maximum elongation was not attained until June 10. This may account for the many futile efforts to see *Mercury*. Elongation is a necessary element in his detection, but a crescented phase may so enfeeble his light as to render him utterly beyond reach, as on May 29th.

Venus has been quite conspicuous as a naked-eye object in sunshine during the last three months. The first time I glimpsed the planet (during the present evening apparition) was on February 22, at $4^h 45^m$. On February 23 she was seen at $1^h 45^m$, and on February 28 precisely at noon. On the latter date I watched the planet for about 30^m; she was somewhat faint, though I found her readily enough a few degrees west of the crescent of the new moon. She was plainer on March 4 at $1^h 40^m$. The planet must be rarely seen at noon so early as February 28, as the circumstances are unfavourable. On the occasion now referred to the semi-diameter was scarcely $7''$, and altitude 35°. The fact of her visibility at such a time proves with what ease she may be seen under better conditions.

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During the present month her high altitude has rendered her surprisingly bright as a daylight object, and in strong contrast with her feebleness when I saw her at the end of February.

Bristol, May 30, 1876.

On the Atmosphere of Venus.

By E. Neison, Esq.

In the *Astronomische Nachrichten* for 1849 (No. 679, vol. xxix. p. 107) are published some observations, by Clausen and Mädler, of the prolongation of the cusps of *Venus* when the planet was near conjunction, and which showed that the Sun's rays underwent a considerable refraction from the atmosphere of the planet. The extent of the prolongation of the cusps of *Venus* was measured with the great Dorpat telescope, and from these measures the amount of the horizontal refraction exerted by the atmosphere of *Venus* was ascertained by means of formula which was given.

This formula was as follows:—

Let V = the angular distance between the centres of the Sun and *Venus*;
x = the prolongation of the cusps of the planet;
S = the semi-diameter of the Sun;
ϕ_1 = the radius-vector of *Venus*.

Then the horizontal refraction ζ_o of the atmosphere of *Venus* was found from the equation

$$\zeta_o = \frac{1}{2}\left(\psi - \frac{S}{\phi_1}\right),$$

where

$$\sin\psi = \sin V \sin x.$$

By this method Mädler found the horizontal refraction of the atmosphere of *Venus* to be $43'\cdot7$, or about $\frac{1}{6}$th greater than the Earth's. This result Mädler subsequently sent to the Astronomer Royal, who communicated an account of the same to the Royal Astronomical Society, and it appeared, in due course, in the *Monthly Notices* (vol. xviii. p. 320).

Lately this formula has been employed by Professor C. S. Lyman, of Sheffield, United States, to reduce similar measures of the prolongation of the cusps of *Venus*, made with a fine 9-in. refractor during 1866 and 1874. By its means Professor Lyman found from his observations $45'\cdot3$ and $44'\cdot5$ for the horizontal refraction of the atmosphere of *Venus*.

A note by Mr. R. A. Proctor, in the *Astronomical Register* (October 1875), induced me, as soon as I had the leisure, to